

REMARKS

This application has been carefully reviewed in light of the Office Action dated June 12, 2008. Claims 1 to 3, 6 to 8, 10 to 14 and 16 to 18 are currently in the application, with claims 4, 5, 9 and 15 having been cancelled and new claims 17 and 18 having been added herein. Claims 1, 8 and 12 are the independent claims. Reconsideration and further examination are respectfully requested.

Initially, Applicants thank the Examiner for the indication that claims 7 and 11 contain allowable subject matter and would be allowable if rewritten in independent form. Applicants have not rewritten either of these claims in independent form at this time since all of the claims remaining in the application are believed to be in condition for allowance, as discussed in more detail below.

Independent claim 1 has been amended to include the subject matter of dependent claims 4 and 5, which have been cancelled without prejudice or disclaimer of the subject matter contained therein. Independent claim 8 has been rewritten in independent form and amended to include the subject matter of dependent claim 9, which has been cancelled without prejudice or disclaimer of the subject matter contained therein. Independent claim 12 has been rewritten in independent form and amended to include the subject matter of dependent claim 15, which has been cancelled without prejudice or disclaimer of the subject matter contained therein. New claims 17 and 18 depend from claim 8 and correspond with the subject matter of originally filed claims 2 and 3. No new matter is believed to have been added to the application by way of these amendments.

Claims 1 and 2 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,192,677 (“Tost”). Claims 1 and 3 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,513,323 (“Weigl”). Claims 1, 4 and 8 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,605,042 (“Stutzenberger”). Claims 1, 4 to 6, 8 to 10 and 12 to 16 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,884,475 (“Hofmann”). Applicants have reviewed the applied references and respectfully submit that the claimed invention is patentably distinguishable over these references for at least the following reasons.

Independent claim 1 is directed to an engine exhaust emission purification apparatus that includes a reduction catalytic converter disposed in an engine exhaust system to reduce and

purify nitrogen oxides by using a liquid reducing agent and an injection nozzle that supplies by injection the liquid reducing agent to a flow of an exhaust emission upstream from the reduction catalytic converter. A nozzle temperature detecting device is configured to detect a nozzle temperature of the injection nozzle. A temperature maintenance device maintains a temperature of at least a part of a liquid reducing agent supply system including the injection nozzle and piping of the injection nozzle at a temperature lower than a boiling point of a solvent of the liquid reducing agent or equal to or higher than a melting point of dissolved matter. The temperature maintenance device is arranged to route a conduit of engine coolant to a flange for attaching the injection nozzle to the exhaust system to thereby cause heat exchange between the flange and the engine coolant. A circulation control device controls circulation or interception of the engine coolant in the conduit based on the nozzle temperature detected by the nozzle temperature detecting device.

Independent claim 8 is directed to an engine exhaust emission purification apparatus that includes a reduction catalytic converter disposed in an engine exhaust system to reduce and purify nitrogen oxides by using a liquid reducing agent and an injection nozzle that supplies by injection the liquid reducing agent to a flow of an exhaust emission upstream from the reduction catalytic converter. A nozzle temperature detecting device detects a temperature of the nozzle of the injection nozzle. A temperature maintenance device maintains a temperature of at least a part of a liquid reducing agent supply system including the injection nozzle and piping of the injection nozzle at a temperature lower than a boiling point of a solvent of the liquid reducing agent or equal to or higher than a melting point of dissolved matter. The temperature maintenance device is arranged to lead a conduit for the engine coolant to at least a part of the liquid reducing agent supply system to thereby cause heat exchange between the liquid reducing agent supply system and the engine coolant. A circulation control device controls circulation or interception of the engine coolant in the conduit, based on the temperature of the nozzle detected by the nozzle temperature detecting device.

Independent claim 12 is directed to an engine exhaust emission purification apparatus that includes a reduction catalytic converter disposed in an engine exhaust system to reduce and purify nitrogen oxides by using a liquid reducing agent and an injection nozzle that supplies by injection the liquid reducing agent to a flow of an exhaust emission upstream from the reduction catalytic converter. A nozzle temperature detecting device detects a temperature of the nozzle of

the injection nozzle. A temperature maintenance device maintains a temperature of at least a part of a liquid reducing agent supply system including the injection nozzle and piping of the injection nozzle at a temperature lower than a boiling point of a solvent of the liquid reducing agent or equal to or higher than a melting point of dissolved matter. The temperature maintenance device includes a heating device that heats at least a part of the liquid reducing agent supply system and a heating control device that controls the heating device. The heating control device controls actuation of the heating device based on the temperature of the nozzle detected by the nozzle temperature detecting device.

As indicated above, each of independent claims 1, 8 and 12 includes the feature of a nozzle temperature detecting device for detecting the temperature of the injection nozzle. The detected temperature may be used to control circulation or interception of engine coolant in a conduit to a flange for attaching the injection nozzle to the exhaust system (claim 1), to control circulation or interception of engine coolant in a conduit to at least a part of the liquid reducing agent supply system (claim 8), or to control actuation of a heating device for heating at least a part of the liquid reducing agent supply system (claim 12). The applied references are not seen to disclose or even suggest at least the foregoing features of the claimed invention.

Hoffman, which was applied in the rejection of claims 5, 9 and 15, concerns a system for introducing a urea solution into an exhaust gas purification system. Referring to Figure 4 in Hoffman, a temperature sensor 47 is used to monitor the temperature of the urea solution stored in tank 6. *See* Hoffman, col. 8, ll. 28-29. The Office Action has contended that the temperature sensor 47 described in Hoffman corresponds to the nozzle temperature detecting device recited in the claimed invention. Applicants respectfully disagree with this contention.

Hoffman's temperature sensor 47 is not seen to detect the temperature of an injection nozzle, such as nozzle 24. As shown in Figure 4 of Hoffman, temperature sensor 47 is separated from nozzle 24 by several components in the path of the urea solution. For example, heaters 38, 44 and 46 are arranged between temperature sensor 47 and nozzle 24. Because temperature nozzle 47 is located upstream from heaters 38, 33 and 46, and nozzle 24 is located downstream from these heaters, the temperature of the urea solution in tank 6 is seen to have little to no correlation with the temperature at nozzle 24. Therefore, temperature sensor 47 is not seen to detect the temperature of an injection nozzle.

Because Hoffman is not seen to detect the temperature of an injection nozzle, it follows that Hoffman does not disclose controlling circulation or interception of engine coolant in a conduit to a flange for attaching the injection nozzle to the exhaust system based on a detected nozzle temperature (claim 1), controlling circulation or interception of engine coolant in a conduit to at least a part of the liquid reducing agent supply system based on a detected nozzle temperature (claim 8), or to controlling actuation of a heating device for heating at least a part of the liquid reducing agent supply system based on a detected nozzle temperature (claim 12).

The other references applied in the Office Action, namely Tost, Weigl and Stutzenberger, are not seen to disclose or suggest anything to remedy the deficiencies of Hoffman noted above. In particular, these references are not seen to disclose or suggest at least the features of a nozzle temperature detecting device for detecting the temperature of the injection nozzle and using the detected temperature to control circulation or interception of engine coolant in a conduit to a flange for attaching the injection nozzle to the exhaust system (claim 1), to control circulation or interception of engine coolant in a conduit to at least a part of the liquid reducing agent supply system (claim 8), or to control actuation of a heating device for heating at least a part of the liquid reducing agent supply system (claim 12).

Accordingly, independent claims 1, 8 and 12 are believed to be allowable over the applied references. Reconsideration and withdrawal of the § 102(b) rejections of these claims are respectfully requested.

The other claims remaining in the application are dependent, either directly or indirectly, from the independent claims discussed above and therefore are believed to be allowable over the applied references for at least the same reasons. Because each dependent claim is deemed to define an additional aspect of the invention, however, the individual consideration of each on its own merits is respectfully requested.

In view of the foregoing amendment and remarks, the entire application is believed to be in condition for allowance and such action is respectfully requested at the Examiner's earliest convenience.

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Respectfully submitted,

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